History of C-54-4-4 ('Furr')

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C-54-4-4 is a Murcott x Clementine hybrid that was created by Joe Furr, USDA, Indio, California in 1954.

C-54-4-4 made its way (how and when are not documented) to the USDA station in Weslaco, Texas. Heinz Wutscher (USDA, ARS, retired) did some evaluations of the hybrid during his time at the Weslaco station and reportedly published some data on it (where and when are not known, but it should be possible to ferret out this information). According to Wutscher, the original material no longer exists in Texas.

Wutscher brought seeds of C-54-4-4 with him from Texas when he was transferred to Orlando. Seeds were planted (and likely propagated on one or more rootstocks). Some of the material (original seedlings and / or budded trees) was established on the property of Mr. Ori Lee, a long time USDA collaborator, in St. Cloud, Florida.

Initial observations indicated that the material was susceptible to citrus scab. Bill Castle, University of Florida, and Orie Lee propagated ca. 1000 trees from the selection with the hope of finding individuals with resistance to scab, but that effort was a failure. Heinz Wutscher collected budwood and had it irradiated at the ARS lab in Miami with the intent of inducing scab resistance. The irradiated budwood was grafted and trees established on Mr. Lee's property. One of the trees resulting from the irradiated budwood was found to be scab resistant; this was propagated and the trees were planted on Mr. Lee's property. This scab resistant selection has been growing on Mr. Lee's property for several years. In February 2005 Mr. Lee invited ARS, University of Florida, Florida Department of Plant Industry (DPI) and Florida citrus industry representatives to see the trees and sample fruit produced from them (see attachment 1). The selection was very well received by the industry representatives and they expressed interest in having trees of the material. According to Florida statues, propagation of citrus trees is not allowed until the material has been certified free of specific graft transmissible pathogens. Budwood of the selection was collected by DPI and placed into the budwood registration program. Mr. Lee voiced strong concern at the time that no restrictions be placed on availability of the budwood. In addition, it was proposed that C-54-4-4 be named "Furr" due to the fact that it was Joe Furr who made the original cross.

Wutscher has provided budwood of the scab resistant material to people in Australia. In Australia the selection was named "Taylor Lee". The variety has been grown commercially in Australia; however, due to a canker eradication effort in Australia no trees of the material remain.

Wutscher also provided budwood of the selection to Graham Berry (one of Bill Castle's former students) in South Africa. Apparently the material has been evaluated in South Africa where it has generated considerable interest amongst the citrus industry.

In addition, Wutscher has given trees of the irradiated selection to a number of individuals in Florida.

Although the history of 'Furr' (ne. C-54-4-4) is rather complicated, it is without question that the selection originated from the USDA citrus breeding program. During its history, C-54-4-4 has been in the possession of numerous individuals and has been evaluated in Florida by both USDA scientists and Bill Castle of the University of Florida. Mr. Lee has also collected a significant amount of data from the C 54-4-4 trees growing on his property.

Attachment 1 – Field Day held at the Lee Grove, St. Cloud, FL

Introduction of "Furr" mandarin to citrus industry representatives

- Murcott x Clementine hybrid
- Cross made in 1954 by Joe Furr, USDA, Indio CA
- Brought to Florida by Heinz Wutscher, USDA
- Seeds were irradiated to induce resistance to scab
- A scab resistant selection was identified, propagated and grown at Lee Groves, St. Cloud, FL

- Mature in December
- Easy to peel
- Firm texture

Orie Lee discussing "Furr' with industry representatives

Quentin Roe inspecting Furr trees

Attachment 2 – Fruit quality data for “Furr” mandarin

"Furr" tangerines
Harvested 12/28/2005
Lee Groves, St. Cloud, FL

Days after harvest	Fruit wt (g)	Dia. (in.)	Rind color	Juice vol. (ml)	Juice color (n)	Brix	% citric acid	Ratio
0	175.8	2.8	0.502	760	44.4	13.5	0.865	15.61
7	169.2	2.8	0.526	615	44.5	14.3	0.886	16.14
14	157.1	2.9	0.475	590	44.8	14.3	0.750	19.07
21	155.0	2.7	0.512	670	45.7	14.1	0.743	18.98
28	144.7	2.7	0.598	510	44.9	14.5	0.765	18.95

No incidence of postharvest decay or physiological breakdown was noted on fruit that had been held for 28 days at 5C.

Informal taste tests were done at 0 and 14 days after harvest, at both times all respondents (12-15) indicated a “like” or “extremely like” the taste of the fruit.

Attachment 3

Dear Dr. Arnold **January 2008**

My name is Andrew Lee and I have recently been appointed Manager of the Cultivar Development Division of Citrus Research International (CRI), which is the Research and Technical Company of the South African Citrus Industry.

It has come to my attention recently that a Murcott x Clementine hybrid is a part of our variety collection. The cultivar is seedy, medium to large in size and matures in July in our Cape climatic areas. The material underwent South Africa's (SA's) normal quarantine procedures and has been established at SA's Citrus Foundation Block (CFB) which is situated in the Eastern Cape. Evaluations carried out on fruit from trees at the CFB have shown this to be a promising cultivar suitable for markets that do not have a problem with seedy fruit.

I have not been able to source any contract or testing agreement for this cultivar, but have ascertained that it evidently originated from Florida, USA. The exact source and means by which this cultivar was imported are unknown to me so I am writing to you to establish if this cultivar is in fact the property of the USDA in Florida and if so whether you would be willing to allow us to continue with its propagation in South Africa.

Should the cultivar be USDA property and should you be willing for us to proceed with its commercialisation CRI would protect and control all aspects of its propagation and dissemination in South Africa.

I apologise for the vague areas in this communication, but being very new in my CRI position I am still finding my way through the procedures, channels etc. of cultivar development in South Africa.

Thank you

Yours sincerely

Andrew Lee
Manager Cultivar Development
Citrus Research International